



# Spectral Gamma-Ray Borehole Log Data Report

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Borehole

# 20-07-11

Log Event A

## Borehole Information

Farm : <u>B</u>	Tank : <u>B-107</u>	Site Number : <u>299-E33-147</u>
N-Coord : <u>45,280</u>	W-Coord : <u>52,770</u>	TOC Elevation : <u>653.63</u>
Water Level, ft :	Date Drilled : <u>4/30/1970</u>	

## Casing Record

Type : <u>Steel-welded</u>	Thickness : <u>0.280</u>	ID, in. : <u>6</u>
Top Depth, ft. : <u>0</u>	Bottom Depth, ft. : <u>100</u>	

## Borehole Notes:

Borehole 20-07-11 was drilled in April 1970 to a depth of 100 ft. The borehole was completed with 6-in. casing. Data from the drilling log and Chamness and Merz (1993) were used to provide borehole construction information. These references do not indicate that the borehole casing was perforated or grouted. The casing thickness is presumed to be 0.280 in., on the basis of the published thickness for schedule-40, 6-in. steel tubing.

## Equipment Information

Logging System : <u>1B</u>	Detector Type : <u>HPGe</u>	Detector Efficiency : <u>35.0 %</u>
Calibration Date : <u>02/1997</u>	Calibration Reference : <u>GJO-HAN-14</u>	Logging Procedure : <u>MAC-VZCP 1.7.10-1</u>

## Logging Information

Log Run Number : <u>1</u>	Log Run Date : <u>09/26/1997</u>	Logging Engineer: <u>Bob Spatz</u>
Start Depth, ft.: <u>99.5</u>	Counting Time, sec.: <u>100</u>	L/R : <u>L</u> Shield : <u>N</u>
Finish Depth, ft. : <u>65.0</u>	MSA Interval, ft. : <u>0.5</u>	Log Speed, ft/min.: <u>n/a</u>
Log Run Number : <u>2</u>	Log Run Date : <u>11/30/1998</u>	Logging Engineer: <u>Alan Pearson</u>
Start Depth, ft.: <u>0.0</u>	Counting Time, sec.: <u>100</u>	L/R : <u>L</u> Shield : <u>N</u>
Finish Depth, ft. : <u>10.0</u>	MSA Interval, ft. : <u>0.5</u>	Log Speed, ft/min.: <u>n/a</u>
Log Run Number : <u>3</u>	Log Run Date : <u>12/01/1998</u>	Logging Engineer: <u>Alan Pearson</u>
Start Depth, ft.: <u>66.0</u>	Counting Time, sec.: <u>100</u>	L/R : <u>L</u> Shield : <u>N</u>
Finish Depth, ft. : <u>9.0</u>	MSA Interval, ft. : <u>0.5</u>	Log Speed, ft/min.: <u>n/a</u>



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### Logging Operation Notes:

This borehole was logged by the SGLS in three log runs. Log run one (65 to 99.5 ft in depth) was completed in September 1997 with logging unit designated Gamma-1B. The remainder of the footage in the borehole was logged in November and December 1998 with a different logging unit designated Gamma-2B. Separate calibration files were applied to the logging data. The calibration reference for these files are contained in GJO-HAN-14 for log run one and GJO-HAN-20 for log runs two and three.

The top of the borehole casing, which is the zero reference for the SGLS, is about 0.5 ft above the ground surface at the foot of a 4 ft high by 10 ft wide bern. The total logging depth achieved was 99.5 ft.

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## Analysis Information

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Analyst : P.D. Henwood

Data Processing Reference : MAC-VZCP 1.7.9

Analysis Date : 05/03/1999

### Analysis Notes :

The pre-survey and post-survey field verification for the logging runs met the acceptance criteria established for peak shape and system efficiency. The energy calibration and peak-shape calibration from the accepted calibration spectrum that most closely matched the field data were used to establish the peak resolution and channel-to-energy parameters used in processing the spectra acquired during the logging operation.

A casing correction factor for a 0.280-in.-thick steel casing was applied to the concentration data during the analysis process.

A systematic difference in concentration calculations may occur between 65 and 66 ft. Logging procedures require collection of overlapping data for depths where a logging run is terminated and a second logging run is initiated at a subsequent time to provide a check on system depth and data acquisition repeatability. In the case of this borehole, the overlap data were collected over one year apart with different logging systems. Although there are only three overlap data points to evaluate, it would appear on the basis of the total count and the KUT data, the logging system utilized in 1997 resulted in calculated concentrations that are about 10 percent lower than those calculated from the 1998 data. The cause of this discrepancy could be the result of borehole environmental changes or slight changes in the calibration coefficients of the different systems that were determined during separate calibration events. This almost negligible difference in the concentration data did not affect the analysis or interpretation included in the TSDR for tank B-107.

### Log Plot Notes:

Separate log plots show the man-made and the naturally occurring radionuclides. The natural radionuclides can be used for lithology interpretations. The headings of the plots identify the specific gamma rays used to calculate the concentrations. Uncertainty bars on the plots show the statistical uncertainties for the measurements as 95-percent confidence intervals. Open circles on the plots give the MDL. The MDL of a radionuclide represents the lowest concentration at which positive identification of a gamma-ray peak is statistically defensible.

A combination plot includes the man-made and natural radionuclides, the total gamma derived from the spectral data, and the Tank Farms gross gamma log. The gross gamma plot displays the latest available digital data. No attempt has been made to adjust the depths of the gross gamma logs to coincide with the



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SGLS data.

A plot including historical gross gamma logs from 1975 to 1991 is included to show changes in gamma-ray intensity over time for a depth interval from about 70 to 75 ft.

A shape factor plot is included to show the possible Sr-90 contamination at about 74 ft.

**Results/Interpretations:**

The radionuclide Cs-137 was detected around this borehole. The Cs-137 contamination was detected between the ground surface and a depth of about 13.5 ft. The measured concentrations were less than 1 pCi/g.

The K-40 concentrations increase at about 40 ft, possibly representing the transition from the backfill material to the undisturbed Hanford formation sediments.

Shape factor analysis indicates an elevated low-energy continuum in the absence of gamma-emitting radionuclides at about 74 ft in depth that may represent the existence of Sr-90.

Additional information and interpretations of log data are included in the main body of the Tank Summary Data Report for tank B-107.